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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/705,661	11/03/2000	Kazuto Okazaki	4296-123	6250

7590 05/12/2005

Diane Dunn McKay Esq  
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EXAMINER

RIDLEY, BASIA ANNA

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 05/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Interview Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/705,661	OKAZAKI ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Basia Ridley	1764	

All participants (applicant, applicant's representative, PTO personnel):

(1) Basia Ridley. (3)\_\_\_\_\_.

(2) Diane Dunn McKay. (4)\_\_\_\_\_.

Date of Interview: 11 May 2005.

Type: a) ☒ Telephonic b) ☐ Video Conference  
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 8.

Identification of prior art discussed: Admitted Prior Art & Oswald et al. (USP 4,769,998).

Agreement with respect to the claims f) ☐ was reached. g) ☐ was not reached. h) ☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN ONE MONTH FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

*Basia Ridley*  
Primary Examiner  
AU: 1764

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

\_\_\_\_\_  
Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

#### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The applicant presented proposed amendment and request for reconsideration (see attachment). The proposed amendment does not place application in condition for allowance because Admitted Prior Art discloses means for adjusting pressure, as recited in proposed claim 8, (see Fig. 1, ref. 24) and because specific operating pressure, as recited in proposed claim 8, does not limit apparatus claim. The applicant argued that neither of the references shows recovering latent heat of the liquefied propylene and/or propane. This is not found persuasive because Admitted Prior Art shows propylene evaporator (Fig. 1, ref. 3) which recovers latent heat of propylene and/or propane). The applicant argued that Oswalt et al. is non-analogous art. In response the examiner reiterated her position as set forth in the Final Office action mailed on 8 February 2005. Further the examiner noted that if said proposed amendment was filed as an After Final Amendment it would not be entered because it introduces new issues that would require further consideration and/or search.

**MATHEWS, SHEPHERD, MCKAY & BRUNEAU, P.A.**

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**F A X C O V E R S H E E T**

**TO:** Examiner Ridley  
**COMPANY:** United States Patent and Trademark Office  
**PHONE:** 571 272 1453  
**FAX:** 571 273 1453  
**FROM:** Diane Dunn McKay **NO. OF PAGES (with cover):** 17  
**RE:** U.S. PATENT APPLICATION NO. 09/705,661  
**DATE:** May 9, 2005

**MESSAGE**

Dear Examiner Ridley:

Please find the attached for our discussion.

Sincerely,

Diane Dunn McKay

This facsimile and any attachment transmitted with it are confidential and intended solely for the use of the individual or entity to which it is addressed, and may contain information that is privileged, confidential, and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this facsimile in error, please notify the originator of the message. Any views expressed in this message are those of the individual sender, except where the sender specifies and with authority, states them to be the views of Mathews, Shepherd, McKay & Bruneau, P.A.

The undersigned certifies that this communication is being deposited with the United States Postal Service as prepaid first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on May 2, 2005.

Diane Dunn McKay

**DRAFT**

Docket No. 4296-123 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of  
OKAZAKI et al.

Serial No. 09/705,661

Filed: November 3, 2000

Title: METHOD FOR PRODUCTION OF  
ACRYLIC ACID AND APPARATUS FOR  
PRODUCTION OF ACRYLIC ACID

Customer No.  
26817

Group/Art Unit: 1764

Examiner: RIDLEY, Basia Anna

Confirmation No. 6250

x

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**AMENDMENT**

Sir:

In response to the Office Action dated February 8, 2005, please amend the above-identified application as follows:

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**Amendments to the Specification:**

Please replace the paragraph beginning at page 13, line 21, with the following rewritten paragraph:

In this invention, the chilled coolant which is obtained from the liquid coolant by heat exchange as described above may be used as the liquid coolant in other heat exchangers as it is. In case the chilled coolant is passed through the line-2 102 and further cooled by the refrigerator 13, the result will become preferable so that the chilled coolant will have a temperature which is appropriate to use in other heat exchangers. When the temperature of the chilled coolant is high, the liquid coolant thermocontroller 26 may be installed at the refrigerator 13 additionally to adjust the temperature of the chilled coolant. The reason for this additional installation is that the adjustment of the temperature consequently attained results in stabilizing the cooling and the condensation in the heat exchangers serving the purpose of supplying the chilled coolant.

Please replace the paragraph beginning at page 14, line 13, with the following rewritten paragraph:

The refrigerator 13, for example, supplies the chilled coolant via the line-3 103 to the absorbing solvent cooler 8 which is attached to the acrylic acid absorbing column 5. Since the temperature of the absorbing solvent is preferred to be low for the purpose of high efficiency of acrylic acid absorption, the absorbing solvent is generally cooled in the heat exchanger before it is supplied to the acrylic acid absorbing column 5 and the liquid coolant for this cooling is introduced from another cooling system. In this invention, the power consumed for cooling can be decreased by using the chilled coolant mentioned above as the liquid coolant to be circulated to the cooler 8. When the chilled coolant is circulated to the cooler 8, the temperature thereof is properly in the range of 0 - 35° C, preferably in the range of 5 - 30° C. In order to prepare the chilled coolant which has appropriate temperature as mentioned above, it is preferable to install the liquid coolant thermocontroller 26 as stated above.

Please replace the paragraph beginning at page 14, line 30, through page 15, line 28, with the following rewritten paragraph:

The absorbing column 5 is generally provided with the circulation cooler 9 for cooling a

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part of the heat entrained by the acrylic acid-containing gas supplied from the reactor 4 and enabled consequently to put to circulation part of the bottom of the column and, at the same time, supply the cooled acrylic acid absorbing solvent 21 from the top of the column, with the result that the temperature of the top of the column and the efficiency of acrylic acid absorption will be maintained at respectively prescribed levels. As the liquid coolant used in the circulation cooler 9, this invention allows use of the chilled coolant prepared as described above. Incidentally, the temperature of the chilled coolant prepared in the evaporator and/or adjusted by the liquid coolant thermocontroller is not always required to be equal to the temperature of the chilled coolant which is supplied to the coolers 8 and 9, etc. The chilled coolant to be circulated to the circulation cooler 9, for example, does not need to be limited to the chilled coolant which is cooled by the refrigerator 13. The chilled coolant withdrawn via the branch from the line 2 102 extending from the evaporator 3 through the refrigerator 13 may be used instead. When the chilled coolant is circulated to the circulation cooler 9, the temperature thereof is properly in the range of 0 - 40° C, preferably 5 - 35° C. The chilled coolant which has undergone heat exchange in the circulation cooler 9 is introduced via the line 5 105 and the chilled coolant which has undergone heat exchange in the cooler 8 is introduced via the line 4 104 and they are mixed. It is preferable to mix the chilled coolant which has different temperature and to return to resultant mixed chilled coolant to the liquid coolant supply system 1 via the line 6 106 and reuse as liquid coolant.

Please replace the paragraph beginning at page 15, line 29, through page 16, line 12, with the following rewritten paragraph:

The chilled coolant emanating from the refrigerator 13 can be advanced through the branch from the line 3 103 and circulated to the condenser 10 attached to the solvent separating column 6 and used therein as the liquid coolant for heat exchange. As the chilled coolant to be used for this purpose, that which has been cooled by the refrigerator 13 proves favorable. When the chilled coolant is circulated to the condenser 10, the temperature thereof is properly in the range of 0 - 35° C, preferably 5 - 30° C. Incidentally, in order to prepare the chilled coolant which has appropriate temperature as mentioned above, the condenser 10 may be provided with the thermocontroller. The chilled coolant which has undergone heat exchange may be advanced



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from the condenser 10 through the line-~~7~~107 and joined to the flow in the line-~~6~~106, again returned to the liquid coolant supplying system 1 and reused as the liquid coolant.

Please replace the paragraph beginning at page 16, line 13, with the following rewritten paragraph:

The process for producing acrylic acid usually involves the acrylic acid refining column 7 in addition to the acrylic acid absorbing column and the solvent separating column mentioned above. When the acrylic acid refining column 7 is involved in the process, the chilled coolant mentioned above may be used as the liquid coolant for the heat exchanger attached to the acrylic acid refining column 7 such as, for example, the condenser 11 attached to the refining column 7. When the chilled coolant is circulated to such a heat exchanger, the temperature thereof is properly in the range of 20 - 35° C, preferably 20 - 30° C. The vapor of acrylic acid is distilled from the acrylic acid refining column 7 through the top thereof and subsequently cooled by the condenser 11 attached to the refining column 7 to obtain acrylic acid. Meanwhile, the liquid 19 containing the by-product is recovered through the bottom of the column. Incidentally, the liquid coolant which has utilized in the condenser 10 attached to the solvent separation column or the condenser 11 attached to the refining column 7 is passed through the line-~~7~~107 and the line-~~8~~108 and mixed with the flow through the line-~~6~~106 and returned to the liquid coolant supplying system 1 and reused as the liquid coolant. When the apparatus for the production of acrylic acid mentioned above is connected to the methacrylic acid and/or (meth)acrylic esters plants 12, the liquid coolant mentioned above may be supplied as the liquid coolant for heat exchange in the plant 12 and the liquid coolant which has undergone this heat exchange advanced through the line-~~9~~109, combined with the flow through the line and returned again to the liquid coolant supplying system 1 and reused as the liquid coolant.

Please replace the paragraph beginning at page 17, line 10, through page 18, line 13, with the following rewritten paragraph:

One example of the chilled coolant used in the process for producing acrylic acid by the series of operations resorting to the reactor 4, acrylic acid absorbing column 5, solvent separating column 6, and refining column 7 has been installed. This invention allows the chilled coolant to be used in such heat exchangers installed in the plants other than the plant for producing acrylic

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acid and the plants further connected to the acrylic acid plant such as, for example, the methacrylic acid and/or (meth)acrylic esters plants 12. When the amount of the heat of the chilled coolant calculated from the amount of the chilled coolant obtained by gasification is in excess of the total amount of the heat required for cooling in the heat exchangers attached to the process for producing acrylic acid, when the amount of the heat of chilled coolant is in excess amount because the chilled coolant has been further cooled by the refrigerator 13, and when the chilled coolant usable for cooling is in excess amount because it has been used only in a part of the heat exchangers involved in the process for producing acrylic acid, these excess of the chilled coolant can be effectively utilized in the plants mentioned above instead of being wasted. Moreover, the use of the chilled coolant results in not only reduction of energy consumption for cooling but also stabilizing the process of production by effective utilization of the latent heat generated by the gasification of propylene. For example, part of the chilled coolant from the line-3 103 can be circulated to and used in the heat exchangers attached to the methacrylic acid and/or (meth)acrylic esters plants 12. The chilled coolant which has undergone heat exchange in this plant may be advanced through the line-9 109 and mixed with the flow through the line 106. Particularly, when the acrylic acid is further esterified to produce the acrylic esters, the chilled coolant supplied to and used in the heat exchangers incorporated in the apparatus for producing esters brings about the advantage of simplifying the installation of piping for the transfer of the chilled coolant.

Please replace the paragraph beginning at page 18, line 20, through page 19, line 3 with the following rewritten paragraph:

Further, this invention may discard the chilled coolant after it has been used for heat exchange and it nevertheless is preferred to have chilled coolants of different temperature levels to be combined and returned to and reused in the liquid coolant supplying system 1 attached to the cooling tower, for example. The discard of the chilled coolant in a large volume is unfavorable from the environmental ~~preservation~~-preservation and economical point of view. This invention is also excellent in being capable of contributing to the preservation of environment owing to the cyclical use of the liquid coolant. The chilled coolant which is circulated to the liquid coolant supplying system 1 may be supplied via the line to the group of

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liquid coolant using devices 29 and used therein and, after being used therein, forwarded via the line-~~10~~ 110 and combined with the flow in the line-~~6~~ 106 and circulated to the liquid coolant supplying system 1.

Please replace the paragraph beginning at page 25, line 27, through page 26, line 15 with the following rewritten paragraph:

The brine to be used as the liquid coolant is transferred from the liquid coolant tank 27 through the line-~~11~~ 111 to the liquid coolant heater 2 by means of the liquid coolant transfer pump 28. When the liquid coolant tank 27 is additionally provided with the liquid coolant thermocontroller 23, liquid coolant heater 2 which is provided in part of the line-~~11~~ 111 is no longer required. Particularly, however, the brine is capable of retaining the lower temperature than water. In case the apparatus which produces (meth)acrylic acid and/or (meth)acrylic ester and involves cyclic use of the chilled coolant, for example, has part thereof suspended from operation, there are cases where the temperature of the liquid coolant falls to extremely low level. In this case, therefore, it is preferable to make the liquid coolant temperature controlled in the range of 0-50° C by using the liquid coolant heater 2 and then introduce it into the evaporator 3 through the line-~~11~~ 101. When the brine is used, for example, by supplying brine having an ethylene glycol concentration of 30 mass % at the temperature in the range of 0 - 30° C to the evaporator 3, it makes possible to obtain the chilled coolant having the temperature in the range of -5 - 25° C.

Please replace the paragraph beginning at page 26, line 16, through page 27, line 15 with the following rewritten paragraph:

When the plant is provided with lines so installed that the chilled coolant used in any of the heat exchangers incorporated in the plant may be recovered in the liquid coolant tank 27, it makes possible to store the used chilled coolant in the liquid coolant tank 27 and transfer the liquid coolant from the tank using the liquid coolant transfer pump 28 which is installed in the line-~~11~~ 111 connected to the tank. When the liquid coolant tank 27 is disposed as described above, the pressure accumulating in the line for the liquid coolant transfer and the non-condensable gas possibly leaking in a minute amount into the liquid coolant may be separated. Particularly since the brine can be a chilled coolant of a lower temperature than water, the liquid

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coolant may be circulated only partly to the evaporator 3 and used as the chilled coolant instead of being wholly circulated to the evaporator 3. For example, part of the liquid coolant flowing from the liquid coolant transfer pump 28 through the line-~~11~~ 111 is circulated to and cooled in the evaporator 3, forwarded via the line-~~2~~ 102 which is the line of the chilled coolant from the evaporator 3, and combined with the flow through the line-~~11~~ 111. The chilled coolant which has been obtained by being cooled as described above has a temperature different from the temperature of the liquid coolant flowing through the line-~~11~~ 111 and the line-~~2~~ 102. When the line-~~12~~ 112 is laid subsequently to the point of confluence, the chilled coolant can be forwarded through the line-~~12~~ 112 directly to the circulation cooler 9 attached to the acrylic acid absorbing column and used therein as the chilled coolant. The chilled coolant may be transferred through the line-~~12~~ 112 to the refrigerator 13, further cooled therein, and thereafter forwarded to the circulation cooler 9 attached to the acrylic acid absorbing column and used as the chilled coolant therein.

Please replace the paragraph beginning at page 29, line 15, with the following rewritten paragraph:

As the "means for using the chilled coolant in heat exchangers attached to the apparatus for producing acrylic acid or acrolein," the piping connected from the evaporator 3 to various heat exchangers, the lines-~~2, 3, and 11~~ 2, 102, and 111, and various heat exchangers may be cited. The pipe lines may include temperature adjusting means such as the liquid coolant thermocontroller 23 for the chilled coolant and the gas flow rate controller 25 as means for flow rate adjustment and they may be additionally provided with the refrigerator 13 for further cooling the chilled coolant and the liquid coolant thermocontroller 23.

Please replace the paragraph beginning at page 29, line 26, through page 30, line 2 with the following rewritten paragraph:

The apparatus for production according to this invention can include "means for circulating the chilled coolant used in the heat exchangers to means for preparing the chilled coolant." As concrete examples of this circulating means, the pipe lines for circulating the chilled coolant circulated to the heat exchangers to the liquid coolant supplying system 1, namely

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the lines ~~4, 5, 6, 7, 8, 9, and 11~~ 104, 105, 106, 107, 108, 109, and 111. These pipe lines may be additionally provided with the liquid coolant transfer pump 28.

Please replace the paragraph beginning at page 31, line 13, with the following rewritten paragraph:

This chilled coolant was circulated to and used in absorbing solvent cooler 8, the condenser 10 attached to the solvent separating column, and the condenser 11 attached to the refining column. The used chilled coolant was introduced to the liquid coolant supplying system 1 and reused as liquid coolant. To the circulation cooler 9 attached to the acrylic acid absorbing column, the chilled coolant having the temperature of 27° C was directly supplied through the line ~~2~~ 102.

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**Amendments to the Claims:****Listing of Claims:**

1. (Canceled).

2. (Canceled).

3. (Canceled).

4. (Canceled).

5. (Canceled).

6. (Canceled).

7. (Canceled).

8. (Currently amended) An apparatus for production of acrylic acid or acrolein having a catalytic gas phase oxidation reactor, comprising:

a) an evaporator for gasifying liquefied propylene and/or propane as raw material of acrylic acid or acrolein,

b) means for supplying a liquid coolant in the range of 0 to 50° C to said evaporator,

c) means for chilling the coolant in the range of -10 to 40° C in the evaporator by recovering latent heat of the liquefied propylene and/or propane,

d) means for subjecting resultant gasified propylene and/or propane to said catalytic gas phase oxidation reactor thereby preparing a gas containing acrylic acid or acrolein, and

e) means for circulating coolant from the evaporator to heat exchangers, which are attached to the apparatus, said heat exchangers being at least one member selected from the group consisting of an absorbing solvent cooler and a circulation cooler attached to the acrylic acid absorbing column, a condenser attached to the solvent separating column, and a condenser attached to the acrylic acid refining column; and

f) means for adjusting pressure of the evaporator for gasifying liquefied propylene and/or propane in the range of about 0.2 to about 2 Mpa in gauge pressure.

9. (Previously presented) An apparatus according to claim 8, wherein said means for chilling the coolant includes means for adjusting a temperature of said liquid coolant or means for adjusting a flow amount thereof.

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10. (Canceled).
11. (Canceled).
12. (Canceled).
13. (Canceled).
14. (Previously presented) An apparatus for production of acrylic acid or acrolein having a catalytic gas phase oxidation reactor, comprising:
  - a) an evaporator for gasifying liquefied propylene and/or propane,
  - b) means for supplying a liquid coolant to said evaporator,
  - c) means for chilling the coolant in the evaporator by recovering latent heat of the liquefied propylene and/or propane, wherein said means for chilling the coolant includes means for adjusting a temperature of said liquid coolant or means for adjusting a flow amount thereof,
  - d) means for subjecting resultant gasified propylene and/or propane to a catalytic gas phase oxidation reaction thereby preparing a gas containing acrylic acid or acrolein, and
  - e) means for circulating coolant from the evaporator to heat exchangers, which are attached to the apparatus, said heat exchangers being at least one member selected from the group consisting of an absorbing solvent cooler and a circulation cooler attached to the acrylic acid absorbing column, a condenser attached to the solvent separating column, and a condenser attached to the acrylic acid refining column.

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**REMARKS**

The Office Action dated February 8, 2005 has been carefully considered. Claim 8 has been amended. Claims 8, 9, and 14 are in this application.

The drawings were objected to as including reference character 101 not mentioned in the description. The specification has been amended to include a reference to reference character 101. The drawings are objected to as including lead lines without a corresponding reference numeral or characters lacking lead lines to reference numerals mentioned in the specification. Applicants submit herewith Replacements Sheets 1 and 2 amending Figs. 2 and 3 to correct the lead lines.

Claim 8 has been amended. Support for amended claim 8 is found throughout the specification and in particular on page 13, lines 8-9. No new matter has been entered.

The specification was objected to as informal. The specification has been amended to provide correspondence between the lead lines of the figures and the specification. No new matter has been entered.

The previously presented claims 8, 9, 14 and 15 were rejected under 35 U.S.C. § 103 as obvious in view of admitted prior art shown in Fig. 1 and as described on page 1, line 15 through page 5 line 29 of the present specification in combination with U.S. Patent No. 4,769,998 to Ostwalt et al. Applicants submit that the teachings of these references do not teach or suggest the invention defined by the present claims.

The Examiner states that in view of the admitted prior art, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a liquid coolant in the evaporator of the admitted prior art to prepare a chilled coolant and to use said liquid coolant in the evaporator in the apparatus for producing of acrylic acid or acrolein, as taught by Ostwalt et al., for the purpose of improving operation efficiency, therefore said modification would merely amount to using an available coolant rather than a coolant which has to be prepared in auxiliary process. See page 5, lines 8-13 in the Office Action. However, the present invention is firstly characterized as an apparatus for production of acrylic acid or acrolein having a catalytic gas phase oxidation reactor. In contrast, Ostwalt et al. relates to water chillers and in particular to a system for providing precision control of process water temperatures over a broad range of loads.



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Further, the present invention is secondly characterized by comprising items (a) through (e) in claims 8 and 14. Accordingly, the present invention belongs in the field of an apparatus for production of acrylic acid or acrolein. In contrast, Oswalt et al. which is used for rejecting the present invention is not in the field of an apparatus for production of acrylic acid or acrolein. In particular, Ostwalt et al. describe delivering chilled cooling water from a tank 5 to the load as shown in Fig. 1. The term "load" is typically described as some kind of equipment involved in a process such as an industrial laser machine, an injection molding machine for plastic. See col. 3, lines 24-29. Thus, the technology of Oswalt et al. relates to a mechanically refrigerated chiller system for a process coolant, but never teaches or suggests a process for acrylic acid or acrolein having a catalytic gas phase oxidation reactor and Oswalt et al. neither disclose nor suggest a method for producing acrylic acid and/or acrolein. In addition, Applicants submit that there is no motivation to combine Oswalt et al. directed to a precision-controlled water chiller with Applicants' admitted prior art directed to a process for producing acrylic acid and it is only in hindsight that the Examiner can choose features from Oswalt et al. for combination with Applicants' admitted prior art.

The Examiner states that the admitted prior art discloses that a coolant supplied to said evaporator is chilled by evaporating liquefied propylene and/or propane (Fig. 1). However, there is no teaching or suggestion of propylene and/or propane in Fig. 1. Rather, it is described that only water (col. 3, line 21) passes through the coils immersed in the process coolant in Oswalt et al. In the method for producing acrylic acid or acrolein by a catalytic gas phase oxidation, propylene and/or propane is used as a raw material of acrylic acid or acrolein generally and changed into acrylic acid and/or acrolein by the catalytic gas phase oxidation. Thus, the propylene and/or propane never circulate in the system because of changing into acrylic acid and/or acrolein by catalytic gas phase oxidation as described above. However, in Oswalt et al., a liquid passed through the coils immersed in the process coolant is circulated in the system. Accordingly, Oswalt et al. teach away from the present invention. Additionally, since the propylene and propane generates heat in the process during catalytic gas phase oxidation, if the Oswalt et al. system is to be used for producing acrylic acid or acrolein by catalytic phase oxidation, propylene and propane must be included in the "load" in Fig. 1.

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Furthermore, there is no teaching or suggestion in the combination of the Applicants' admitted prior art or Oswalt et al. that latent heat of the liquefied propylene and/or propane can be used in the acrylic acid process. Rather, in the Applicants admitted prior art, the latent heat of the liquefied propylene and/or propane in the acrylic acid process is wasted in the atmosphere. In contrast, in the present invention, the latent heat is used effectively for preparing a chilled coolant. There is no teaching or suggestion of this feature in either reference or the combination thereof. Instead, it is described that steam 17 is supplied to the evaporator for the purpose of utilizing the high energy of the steam, thereby gasifying liquefied propylene. Further, Oswalt et al. do not teach or suggest chilling a coolant by recovering latent heat of the liquefied propylene and/or propane. Furthermore, there is no teaching or suggestion in the combination of the Applicants' admitted prior art or Oswalt et al. that latent heat of the liquefied propylene and/or propane can be used for chilling a coolant. In addition, there is no teaching or suggestion in the combination of the Applicants' admitted prior art or Oswalt et al. of means for adjusting pressure of the evaporator for gasifying liquefied propylene and/or propane in the range of about 0.2 to about 2 Mpa in gauge pressure. Accordingly, the invention defined by the present claims is not obvious in view of Applicants' admitted prior art in combination with Oswalt et al.

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In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

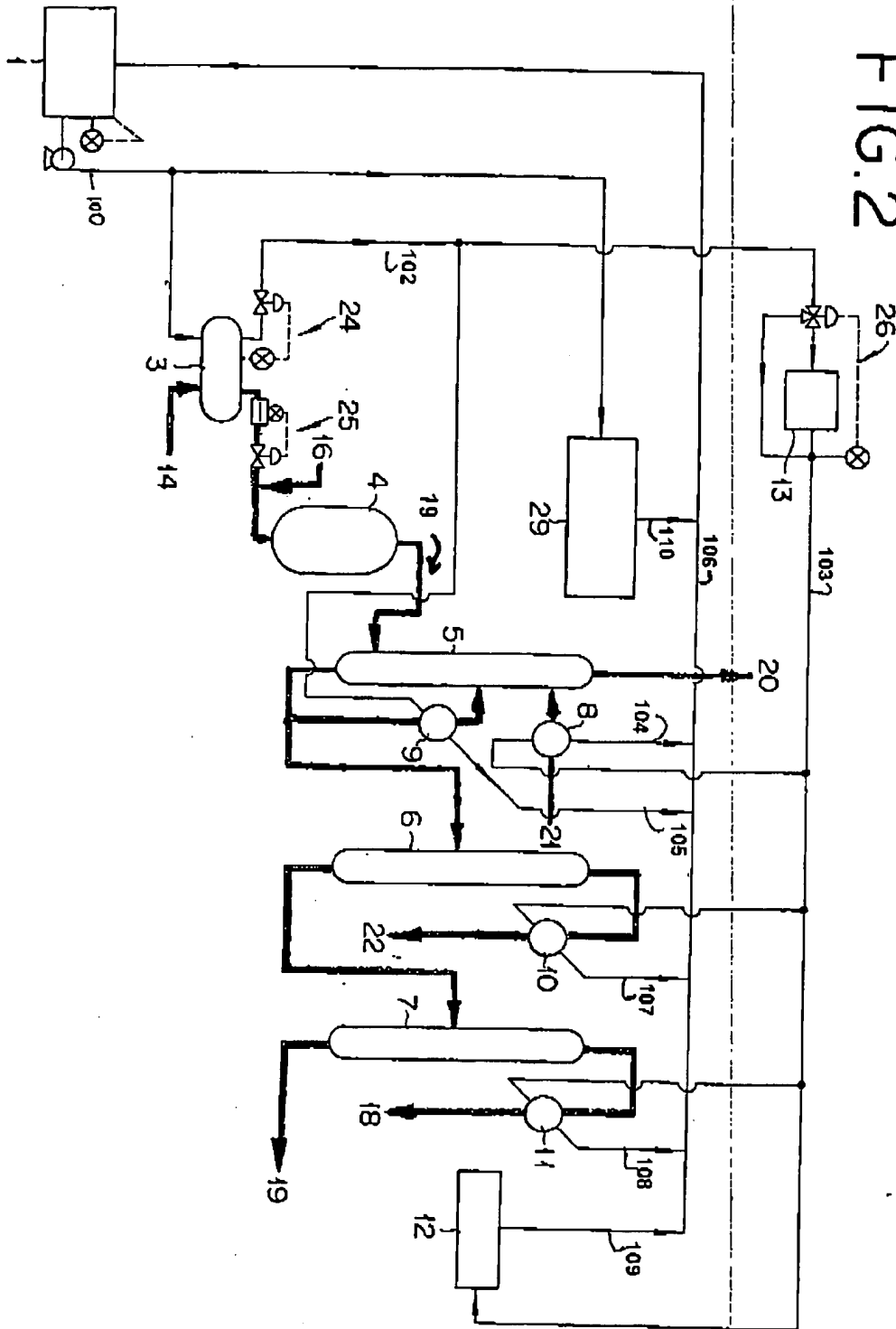
Dated: May 2, 2005

**DRAFT**

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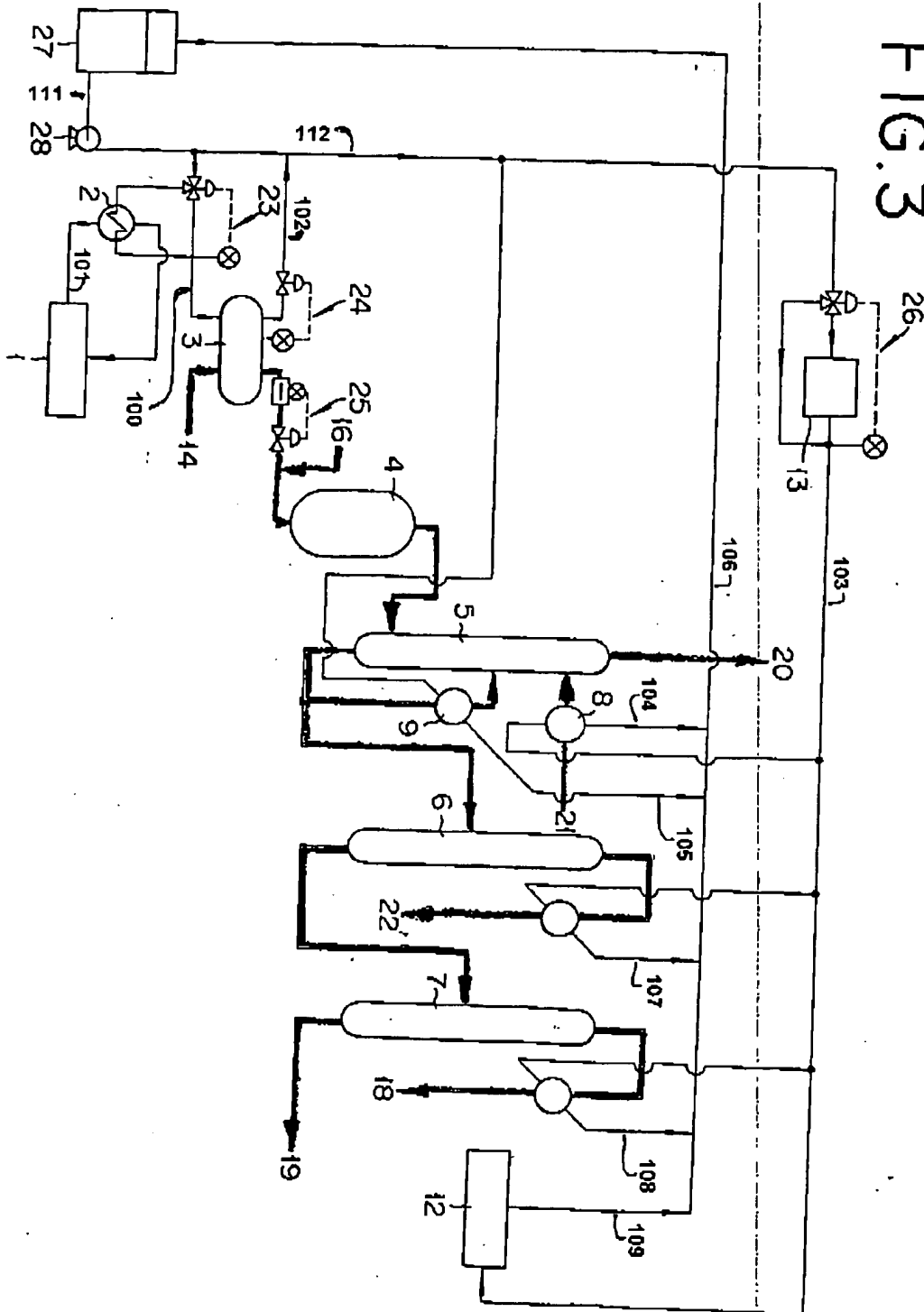
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FIG. 2



Replacement Sheet

FIG. 3



Replacement Sheet